



# **Program Executive Office Command, Control, Communications, Computers and Intelligence (PEO C4I)**

## **PMW/A 170 (Communications) COMTHIRDFLT C4I Waterfront Conference PMW/A 170**

**12 Jun 07  
Vince Squitieri  
PMW/A 170  
(619) 524-7940  
[vincent.squitieri@navy.mil](mailto:vincent.squitieri@navy.mil)**

DISTRIBUTION STATEMENT D. Distribution authorized to the Department of Defense and U.S. DoD contractors only (military critical technology) 12 Jun 07. Other requests shall be referred to the PEO C4I organization (Program Office-PMW/A-170) or SPAWAR Office of Congressional and Public Affairs (SPAWAR 00P).

**PEO C4I**





# Agenda



- **PMW/A 170 Major Programs**
- **SATCOM**
  - SATCOM Roadmap
  - Fleet Bandwidth Expansion Efforts
  - Commercial SATCOM
    - CBSP
    - INMARSAT
    - TV-DTS
  - MILSATCOM
    - SHF (EBEM)
    - EHF
    - GBS
- **SATCOM Reliability**
- **Tactical Comms**
  - Tactical Comms Roadmap
  - HFIP & SNR



# Major Programs PMW/A 170



## **SATELLITE COMMUNICATIONS (SATCOM)**

- Commercial Wideband Satellite Program (CWSP)
- International Maritime Satellite (INMARSAT)
- Commercial Broadband Satellite Program (CBSP)
- TV Direct to Sailors (TV-DTS)
- Enhanced Mobile Satellite Service (EMSS) Iridium
- Super High Frequency (SHF)
- Global Broadcast Service (GBS)
- Navy Extremely High Frequency SATCOM Program (NESP)
- UHF SATCOM (Legacy)
- Navy EHF Multiband Terminal (NMT)
- Transformational Communications (TC)
- Joint Integrated System Technology (JIST Net)

## **COMMON DATA LINK - NAVY (CDL-N)**

- Common High Bandwidth Data Link (CHBDL)

## **COMMUNICATIONS DATA LINK SYSTEM**

**(CDLS)**

TSS: Tactical Switch System  
TVS: Tactical Variant Switch  
PLAN/USQ-167 (m)  
DAGR: Defense Advanced GPS Receiver

## **TACTICAL COMMS**

- Battle Force Email (BFEM 66)
- SubNet Relay (SNR)
- High Frequency Internet Protocol (HFIP)
- Digital Wideband Transmission System (DWTS)
- Enhanced Position Location Reporting (EPLRS)
- Shipboard Single Channel Ground and Airborne Radio System (SINCGARS)
- Switching (TSS, TVS)
- UHF Communications (LOS)
- High Frequency Radio Group (HFRG)
- HF Systems
- Portable Radios
- JTF WARNET

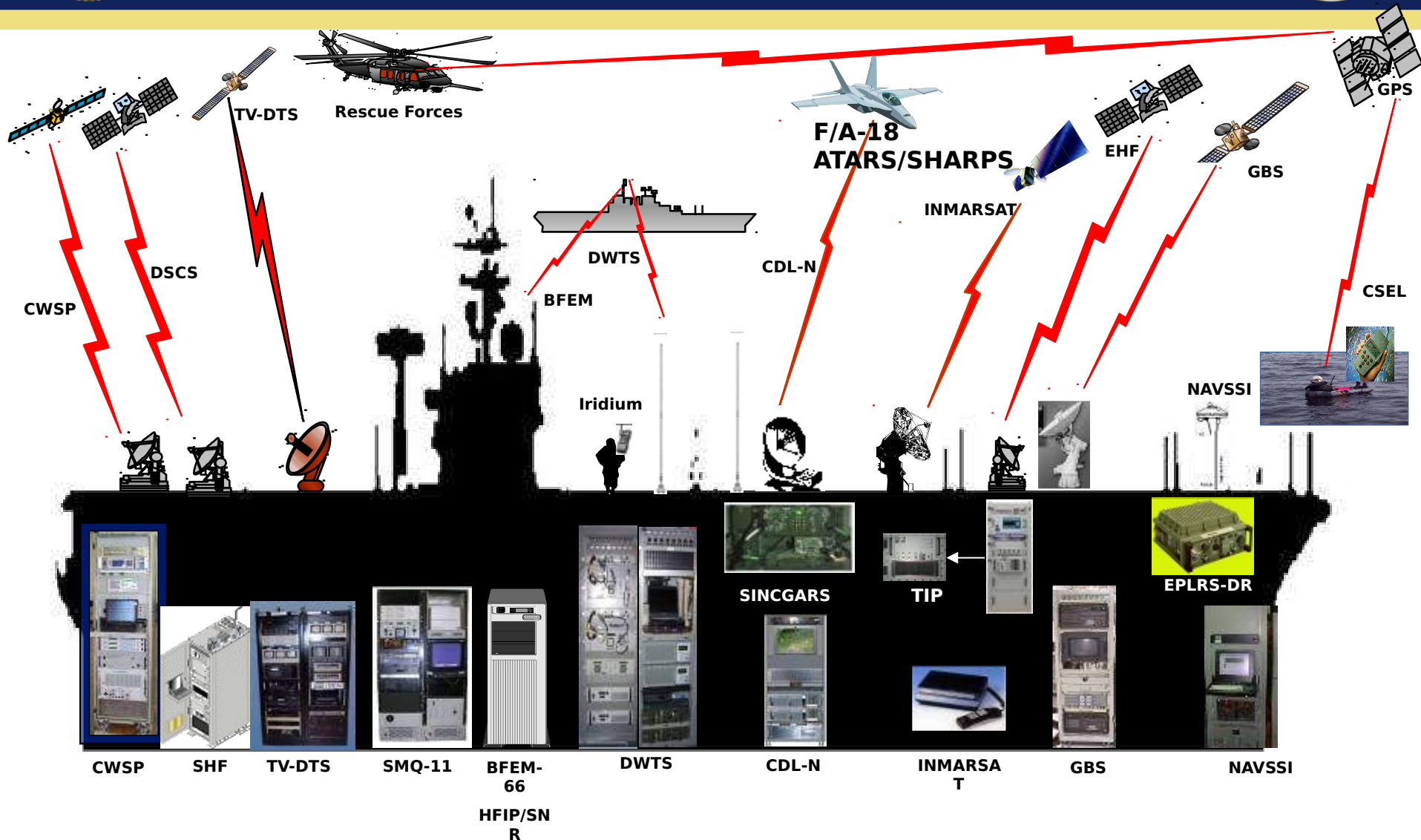
## **NAVIGATION SYSTEMS (NAVSYS)**

- GPS Handheld (PLGR & DAGR)
- Navigation Sensor System Interface (NAVSSI)
- Navigation Warfare (NAVWAR)
- Combat Survivor Evader Locator (CSEL)
- WRN-6

## **METEOROLOGICAL/OCEANOGRAPHY**



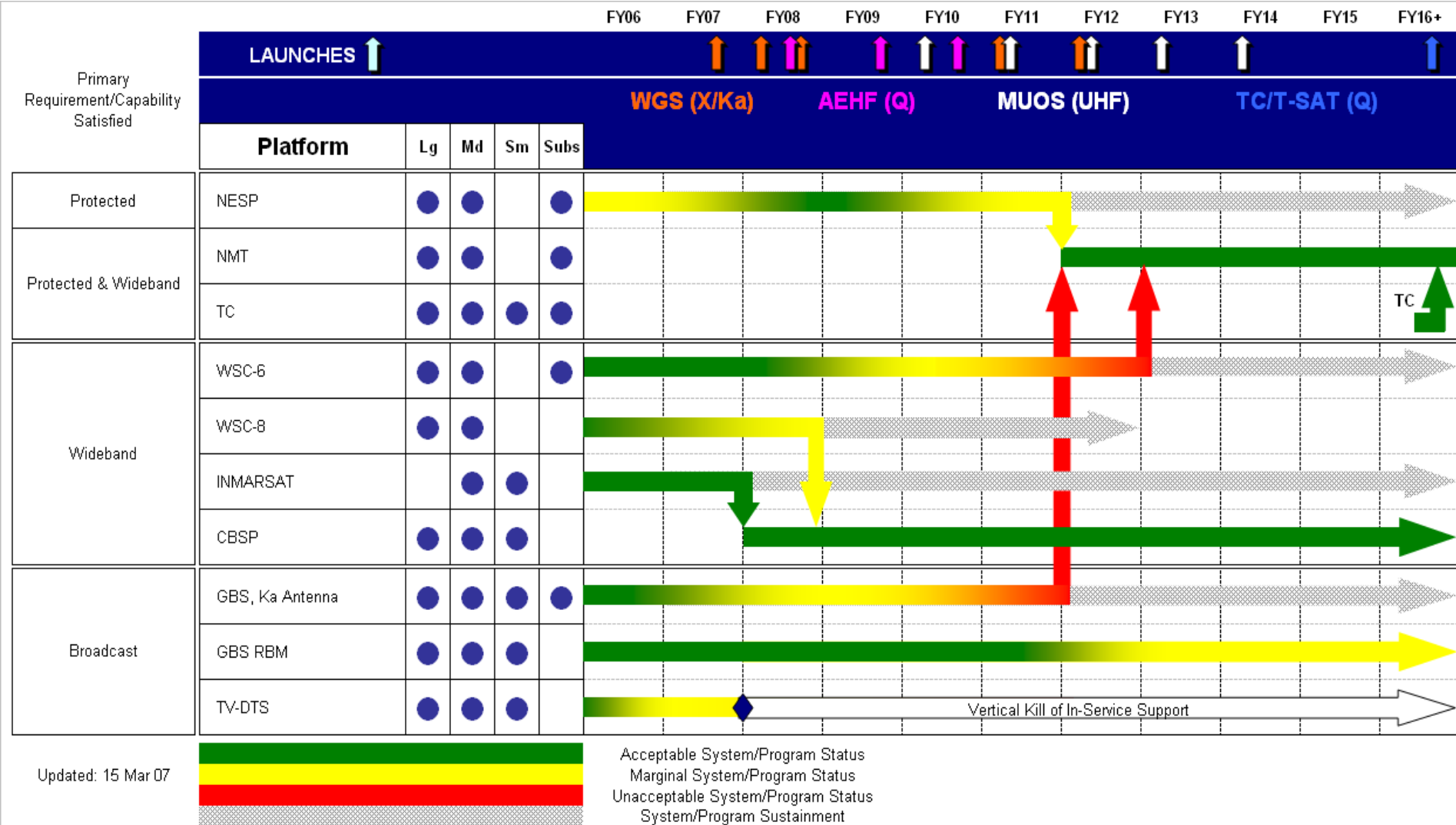
# PMW/A 170 Delivers



Note: Not a representation of all PMW/A 170 programs/products.



# Navy SATCOM Roadmap





# **Fleet Bandwidth Expansion Efforts**



# CVN SATCOM Migration Typical Data Rates



**FY 07**

## **Bandwidth Enablers**

- SHF 1.544
- EHF .128
- CWSP 2.048
- GBS 4.000
- ADNS Inc II

**FY 09**

## **Bandwidth Enablers**

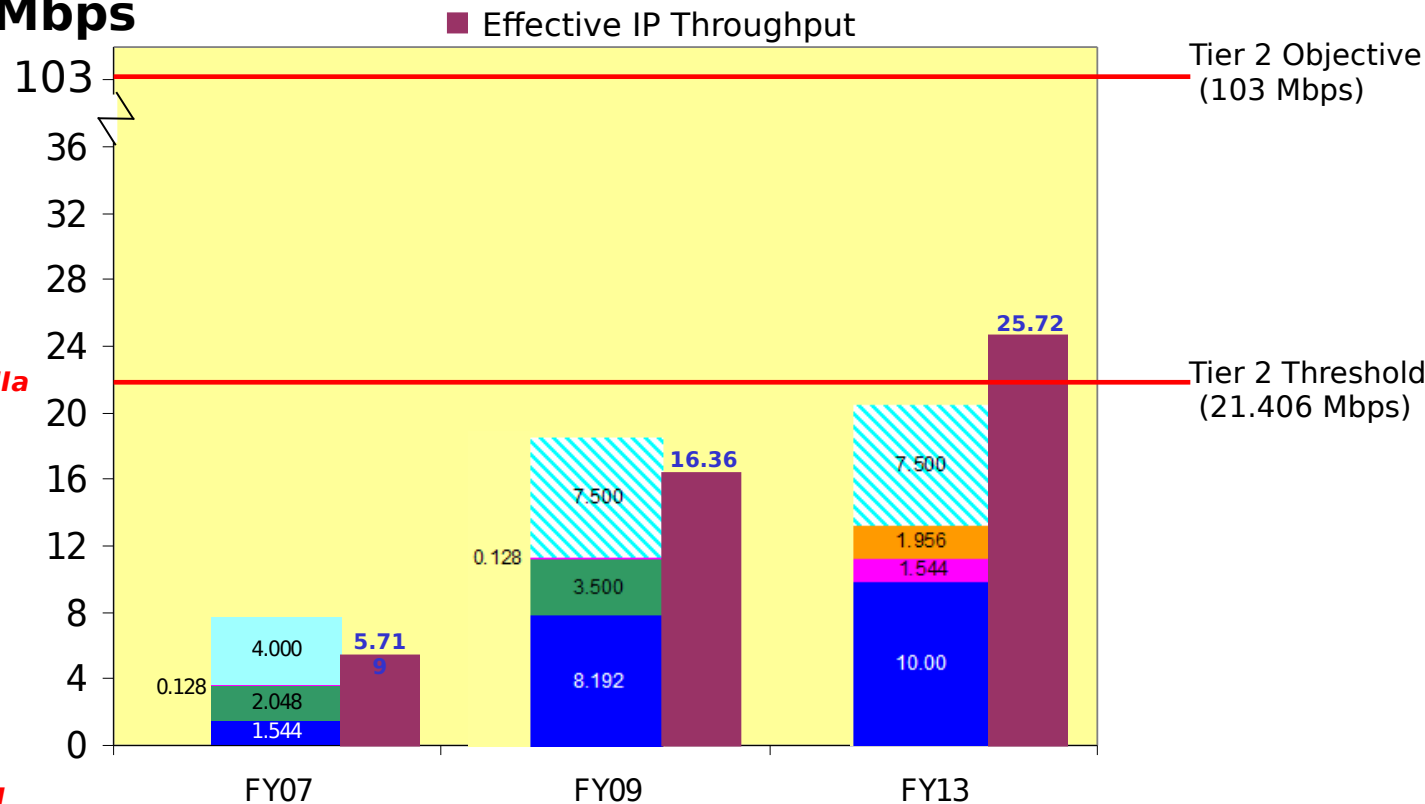
- SHF 8.192
- EBEM & WGS
- ADNS Inc IIa
- EHF .128
- CWSP 3.500
- EBEM
- Split IP GBS 7.500
- WGS
- ADNS Inc IIa

**FY 13**

## **Bandwidth Enablers**

- SHF 10.000
- ADNS Inc III
- EHF 1.544
- NMT
- CBSP 2.124
- Split IP GBS 7.500
- ADNS Inc III

**Mbps**



**Current CBSP Lease Budget Profile Is Insufficient To  
Provide Threshold Data Rates To All Fielded  
Terminals**





# DDG SATCOM Migration Typical Data Rates



## FY 07

### Bandwidth Enablers

- SHF .512
- EHF .128
- INMARSAT .128
- GBS 4.000

ADNS Inc II

## FY 09

### Bandwidth Enablers

- SHF 4.096
- EBEM & WGS
- EHF .128
- Split IP GBS 7.500
- WGS

ADNS Inc IIb

## FY 13

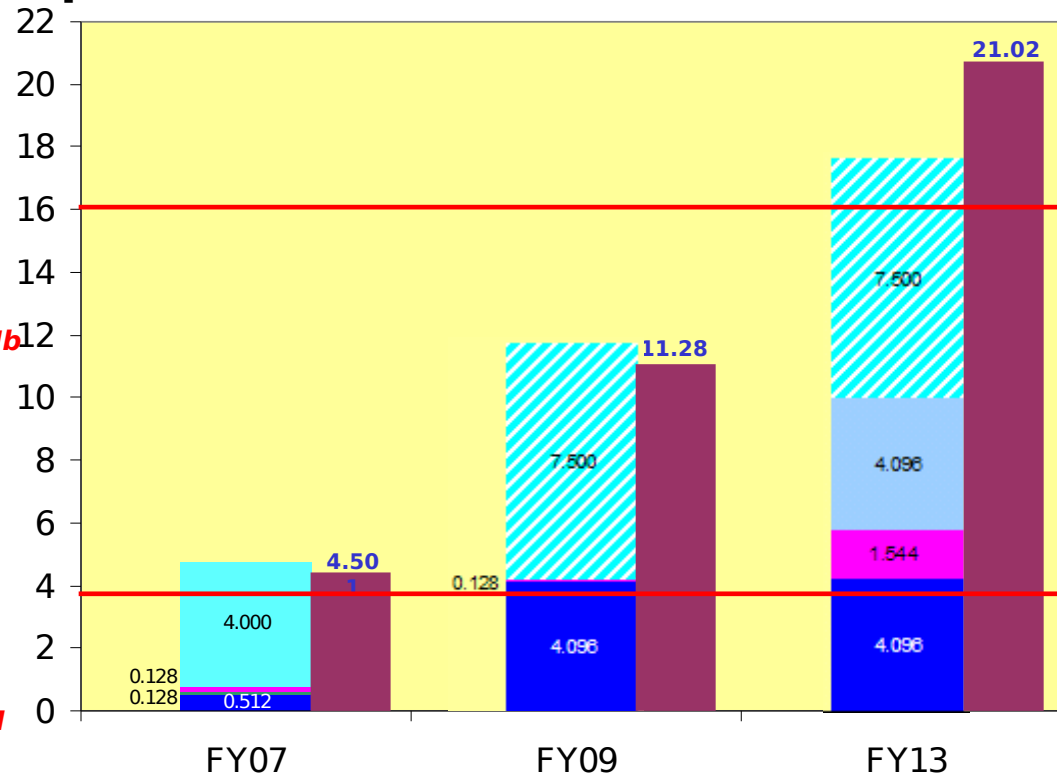
### Bandwidth Enablers

- SHF 4.096
- EHF 1.544
- NMT
- WSC-6 Ka 4.096
- WGS Ka
- Split IP GBS 7.500

ADNS Inc III

Mbps

Effective IP Throughput



Tier 3 Objective  
(16 Mbps)

Tier 3 Threshold  
(3.6 Mbps)

**CBSP install on Medium Ships as Backup to MILSATCOM;  
Additional Lease Budget Required To Achieve Full CBSP  
Capability**





# FFG SATCOM Migration Typical Data Rates



## FY 07 Bandwidth Enablers

- INMARSAT .128
- ADNS Inc II

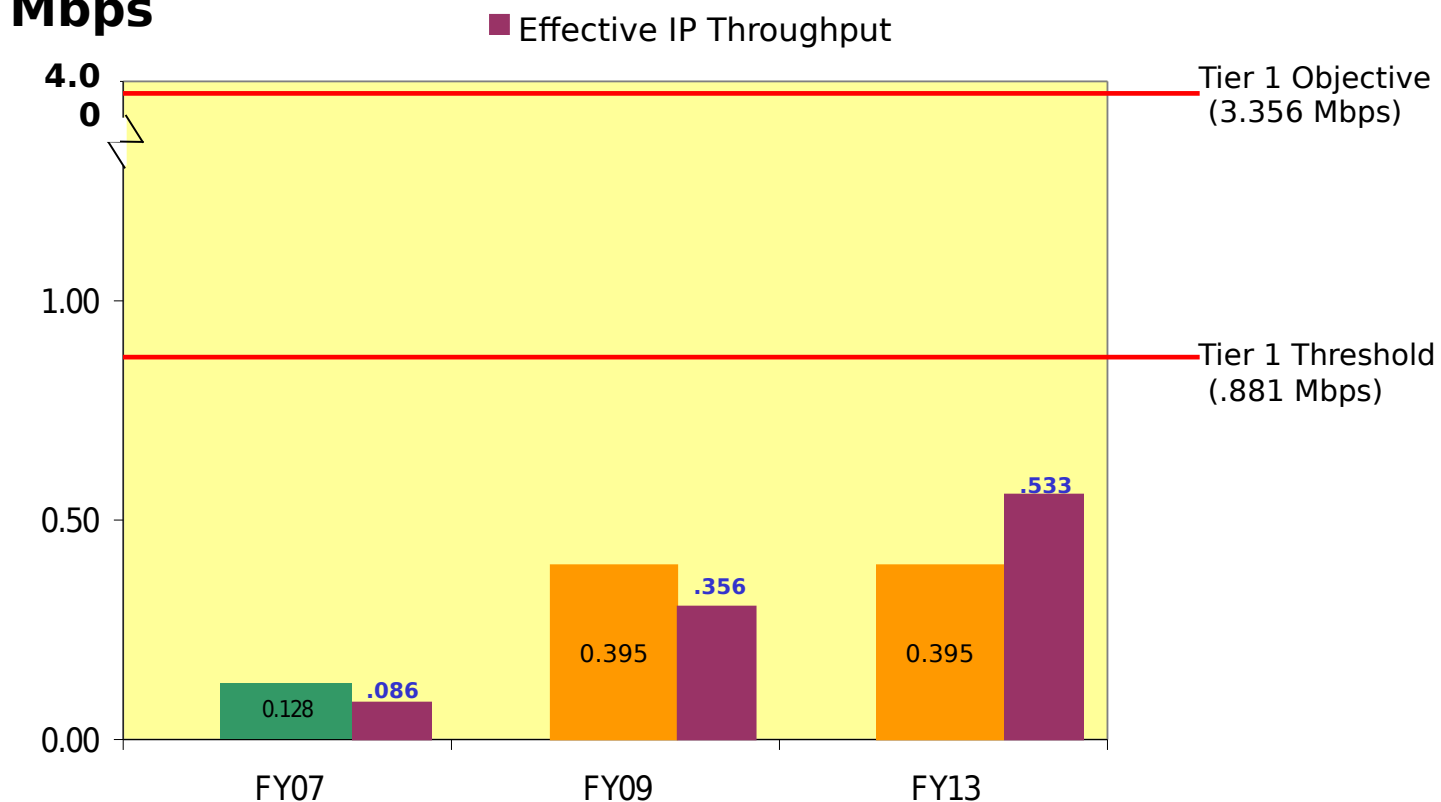
## FY 09 Bandwidth Enablers

- CBSP .395
- ADNS Inc IIb

## FY 13 Bandwidth Enablers

- CBSP .395
- ADNS Inc III

Mbps



**Current CBSP Lease Budget Profile Is Insufficient To  
Provide Threshold Data Rates To All Fielded  
Terminals**



# Commercial SATCOM



# CBSP Requirements

- On 24OCT06, NNWC defined the requirements below
- ~~Terminal Operational~~  
**Availability (Ao):** 97%  
Threshold / 99% Objective
- **End to end Availability:** 97%
- **Coverage:** 95% between 65° latitudes
- **Capacity:** Table on right will be used as base for req't. Numbers are still being refined.

Throughput KPPs	<u>Threshold</u>	<u>Objective</u>
<b>Tier 1</b> (FFGs, MCMs and PCs)	<b>.881 Mbps</b>	<b>3.36 Mbps</b>
<b>Tier 2</b> (CVNs, LHAs, LPD-17s and LHDs)	<b>21.4 Mbps</b>	<b>103 Mbps</b>
<b>Tier 3</b> (DDGs, CGs, LSDs, and LPDs)	<b>3.6 Mbps</b>	<b>16.0 Mbps</b>

Following references were used to develop above KPPs: **NETWARCOM Bandwidth Study**, dated March 2006; **ASD NII Policy**, dated December 2004

*Throughput Augmentation Defined: Commercial SATCOM must augment MILSATCOM by (1) **filling the gap** between existing requirements and Navy allocations and by (2) providing **full redundancy** if MILSATCOM is not available.*



# Market Research WG

## INITIAL SOLUTION

- Small ship terminal (PC, MCM):
  - ~1m Ku terminal
  - Includes static and dynamic modem
- Force level terminal:
  - 2.74m WSC-8 C-band antenna with EBEM
  - Immediate capability to increase throughput to force-level units
- Unit level terminal: (including Tier 1 FFGs)
  - Current Draft Specification:
    - ~1m X+Ku with Ka option terminal with interchangeable components
    - Includes static and dynamic modem
    - Multiple band capability may mitigate substantial EMI risk and offer potential for lease savings using WGS.

## FINAL SOLUTION

- Small ship terminal:
  - Same as initial
- Force level terminal:
  - TBD
- Unit level terminal: (including Tier 1 FFGs)
  - Same as initial

Commercial SATCOM services: Ku and C leases with the possibility of X and Ka leases.

- Teaming effort with DISA
- Consolidated performance-based contract to provide volume discounts, lease portability, surge features



# Program Description INMARSAT



## •Mission Statement

- Provides SATCOM Connectivity for Civil Coordination, NEO Operations, Augmentation of Military Assets; Administrative, Logistics, and Mission Support Traffic; Interoperability With National and International Merchant Shipping; Coordination of Search and Rescue Operations, NIPRNET/SIPRNET Connectivity and Increased Ship to Shore Direct Dial Telephone Access to Support CJTF Operations

## •System Characteristics

- Up to 128 Kbps Data/26.4 kbps Voice  
FAX/TELEX, STU-III Capable
- Dual Installation Provides  
Up To An Additional 32 kbps Data
- JWICS/NIPRNET/SIPRNET/APTS
- Provides SATCOM Capability for



## Small Platforms

APTS: Afloat Personal Telecommunications System  
JWICS: Joint World-wide Intelligence Communications System  
NEO: Non-combatant Evacuation Operations  
CJTF: Commander Joint Task Force

STU: Secure Telephone Unit  
NIPRNET: Nonsecure Internet Protocol Router  
Network  
SIPRNET: Secure Internet Protocol Router Network



# Requirement vs. Budget

	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
Inmarsat Only*	76	63	43	33	21	19
60% coverage	45	37	25	19	12	11
USNS & MOCC	8	8	8	8	8	8
Projected Rqmt	53	45	33	27	20	19
Available leases	67	47	46	15	12	8
Delta	<b>14</b>	<b>2</b>	<b>13</b>	<b>-12</b>	<b>-8</b>	<b>-11</b>

- \*Contingent upon on WSC-6 installs and CBSP fielding plan
- FY 07 – FY 09 above estimated requirements
- FY 10 – FY 12 below estimated requirements



# Program Description (TV-DTS)



- TV-DTS Delivers Enhanced Situational Awareness and Quality of Life Television and Radio Programming to Sailors and Marines at Sea







# Background

- TV-DTS has been in service for 10 years
- Currently in progress: Installations of EC-01 (Software v3.52)
  - 7 of 16 dual antenna platforms completed
  - 96 of 98 mail-out packages for singles sent
- FY08: As a result of POM-08 decisions, the TV-DTS In-Service Engineering Agent (ISEA), SSC-San Diego, will be unfunded starting FY08
  - Liaison with AFRTS, NAVMEDIA, RMC's, and NAVICP indicates all will continue to support the fleet
  - PMW 170 intends this to be a POM-10 submission



# Background: Other Issues



- Fleet training (ISEA provided as there is no formal school)
- Presently, no follow-on contract for hardware support after June FY08 (ISEA contract)
- No system hardware or software upgrades budgeted beyond current installations of software upgrade v3.52 (Engineering Change 1) (ISEA performs)
- Configuration control (ISEA monitors)



# SSC-SD Efforts For The Remainder of FY07



- Continue fleet training classes through the end of FY07
- Ensure TV-DTS documentation is upgraded and current
  - ICD's
  - Tech Manuals
  - Training Guides
  - Acceptance Test Procedures (ATP)
- Maintain liaison with the RMC's, AFRTS, and Naval Media Center
- Work with NAVICP and the SSC-SD depot to establish a repair facility for inoperative components returned by ships (CASREPs, replacement parts, etc.)
- Continue fleet support (both onboard and distant) as appropriate/funded in support of RMC and NAVICP
- Complete the installations of EC-01 in dual antenna ships
- Provide support as necessary to the single antenna ships which have received the EC-01 software via mail-out for ship's force installation
- Continue SCN platform support



# FY08/Summary



- TV-DTS will be considered an unfunded requirement for FY08
- TV-DTS documentation will be provided to the RMC's to assist in fleet support in FY08 (ICD's, upgraded tech manuals, etc.)
- "First line of defense" for any issues regarding shipboard operation will continue to be the RMC's
- NAVICP will continue to provide parts support but stresses that ships must return all components to the supply system for repair and upgrade by the OEM as necessary to ensure availability of parts
- AFRTS will continue to provide the TV-DTS broadcast world-wide
- NAVMEDIA will continue to support the below decks equipment (SITE)



# MILSATCOM



## **SHF Enhanced Bandwidth Efficient Mode (EBEM)**



# EBEM System Description



- Modulation: BPSK, QPSK, OQPSK, 8-PSK, and 16-APSK
- Coding: CEVD, TCM, Reed Solomon (RS) and TURBO
- Modes of Operation MIL-STD-188-165A, IESS-308, IESS-309, IESS-310, EBEM
- IF Interface: 70/140 and L-Band
- IMPCS TX IF Power Control
- Baseband Interfaces: 64 kbps to 155 mbps (antenna H/O mode limited to 10 up and 30 down)
- Information Throughput Adaptation (ITA)
- Pre-distortion and Equalization
- Built-in Diagnostics



CEVD: Convuls Encoding Vitperbi Decoding  
TCM: Trellis Code Modulaion  
IMPCS: Integrated Monitoring Power Control Sub-Systems  
TX IF: Transmission Intermediate Frequency

BPSK: Binary Phase Shift Keying  
QPSK: Quadrature Phase Shift Keying  
OQPSK: Offset Quadrature Phase Shift Keying  
APSK: Amplitude Phase Shift Keying



# EBEM Variants



- Strategic EBEM
  - Installed at STEP and Teleport facilities that utilize DSCS- III satellites including Satellite Life Enhancement Program (SLEP) and future Wideband Global Satellite (WGS)
- Tactical EBEM
  - Installed on Navy ships to support SHF terminals
  - Identical to Strategic except Tactical variant
    - Hardened for shock and vibration
    - Rugged power supply and power switch
    - Added external connector for Antenna Handover signal

STEP: Standardized Tactical Entry Point

DSCS: Defense Satellite Communications System

EBEM: Enhanced Efficiency Bandwidth Modem





# Fleet Update



- FAT conducted by PM DCATS with Navy participation 22 Jul - 06 Oct 06.
  - Shipboard testing for antenna handover conducted on USS PRINCETON (CG-59) 29 - 31 AUG 06 and observed by both PMW/A 170 and COTF representatives
    - Maximum shore-to-ship data rate: over 4 Mbps,
    - Maximum ship-to-shore data rate: over 5 Mbps.
- ViaSat in full production
  - Production Strategic EBEM deliveries began in Nov 06
  - Navy production Tactical EBEM deliveries began in Jan 07
- Ship installs began in Mar 07
  - Fielding planned for completion by end of FY09
- PMW to conduct integration/validation assessments after initial fielding to validate expected capability gains

FAT: Functional Acceptance Testing

DCATS: Defense Communications and Army Transmission System

COTF: COMOPTEVFOR (Naval Command Operational Test and Evaluation Force)

EBEM: Enhanced Bandwidth Efficiency Modem



# Current EBEM Fielding Schedule

SHIP	INSTALLATION DATE
USS WASP	3QFY07 (Complete)
USS LEYTE GULF	1QFY08
USS CAPE SAINT GEORGE	3QFY07
USS COLE	3QFY07
USS RONALD REAGAN	1QFY08
USS NASSAU	3QFY07
USS IWO JIMA	4QFY07
USS CHANCELLORSVILLE	3QFY07
USS GEORGE WASHINGTON	3QFY07
USS BULKELEY	4QFY07
USS ROSS	4QFY07
USS THEODORE ROOSEVELT	4QFY07
USS RAMAGE	4QFY07
USS BARRY	4QFY07
USS MOMSEN	4QFY07
USS GONZALEZ	4QFY07



# Preliminary SOVT/EIV Assessment Results (USS WASP)



- Installation of 2 EBEM modems completed on USS WASP; SOVT signed by ship on 16 May with no discrepancies noted.
- Preliminary Results
  - EBEM to EBEM terminations occurred from ship to shore with two sites:
    - Fort Detrick (STEP)
    - Northwest (TELEPORT)
  - All ship circuits tested over EBEM with no issues
  - EBEM in legacy mode to shore legacy modems (SLM 3650/CQM 248A) established links with no issues
  - EBEM to EBEM in "antenna handover mode," maintained link with no drops during antenna handovers, as compared with legacy modems where circuits dropped every time
  - Ship throughput achieved - Dual channel each at 1.5 Mbps (total 3+ Mbps):
    - Using legacy modems: CQM 248A & SLM 3650 required HPA output power of 201 watts
    - Using EBEM modems in "A/H" mode required HPA output power of 80 watts (with power balancing adjustments, power output got as low as 28 watts)
- PEO C4I/SPAWAR continuing to work with DISA on modem settings to use as we run more terminations from shipboard installations.

EBEM: Enhanced Bandwidth Efficiency Modem

SOVT: System Operation Verification Testing

EIV: EBEM Integration Verification

STEP: Standardized Tactical Entry Point



# **NAVY EHF SATCOM Program (NESP)**



# Program Description EHF



- Mission Statement
  - Provide Protected Communications
    - Hard Core – Command and Control of Special Weapons
    - Core – Tactical, Time-critical Data
- System Characteristics
  - Low Probability of Interception / Detection (LPI / LPD)
  - Anti-Jam (AJ)
  - Survivable
  - World Wide Coverage
  - MDU, ATO, ...Correct Throughput First Time
    - No Re-transmission Required
  - Data Rates up to 1.544 Mbps
  - Netted, Broadcast, and Point-to-Point
  - Joint Interoperability



MDU: Mission Data Update

ATO: Air Tasking Order  
PDU: Power Distribution Unit



# Engineering Changes Fielding Plan



EC #	EC TITLE/DESCRIPTION	PLATFORMS COMPLETED
5	<b>Submarine PPI Upgrade</b> Removes MOV (component causing most failures), adds indication and accessible fuses on front panel *Backfits and new installations	43 of 46 P Platforms Complete
6	<b>Submarine Production Baseline Upgrade</b> Upgrades the following items: VME Rectifier, Down Converter Modulator, Baseband Interface, Interface Adapter, Synthesizer Module, RF Converter, C-Band Interface (CIF), Structure born noise improvements, 5MHz noise immunity improvements, Rubidium Standard, Navigation EMP Adapter, Nameplates, Operator Interface Unit, PDU	26 of 44 P Platforms Complete
7	<b>Surface Production Baseline Upgrade</b> Upgrades the following items: VME Rectifier, Down Converter Modulator, Baseband Interface, Interface Adapter, Synthesizer Module, RF Converter, C-Band Interface (CIF), Structure born noise improvements, 5MHz noise immunity improvements, Rubidium Standard, Prime Power Interface, Antenna Cable Markers, Antenna Kick Plates, SSA Fan Motors, SSA Band Pass Motors, Slip Rings, Inertial Data Assemblies, Radar Absorbing Material, Verification of hardened Solid State Amplifier and Electro Magnetic Interface cables, Antenna balance, Navigation EMP Adapter, Antenna Motor Box EMP Filter, Nameplates, Operator Interface Unit *Backfits only	63 of 96 P Platforms Complete
8	<b>Shore Production Baseline Upgrade</b> Same upgrades as EC 7 *Backfits only	26 of 39 P Platforms Complete
9	<b>L03 Software Upgrade</b> Upgrades the following items: 1553 interface for SSGN/SSBN, periscope protection upgrades, navigation latency upgrades for VC/SSGN/SSBN, correct faults that erroneously specify that a terminal reset is needed, modify LDR automatic reallocation protocol, LDR loopback test corrected *Backfits only	114 of 179 P Platforms Complete



# EHF TIP



- Baseband Equipment Supporting EHF Operations
  - Allows Netted Topology
  - Dynamic Bandwidth Allocation over EHF
  - Provides near real-time ship to ship targeting data transfer (<2 second)
- Standing TIP Supernet
  - Requires No Shore Changes when Strike Group enters AOR
- Failover
  - IKE SHF failed and data went over TIP NET to USS Ramage and then to shore over their SHF
  - Transparent to User

TIP: TDMA (Time Division Multiple Access) Interface Processor  
AOR: Area of Responsibility





# EHF System Reliability

MTBF BreakDown	All Installed Platforms	Upgraded Platforms (EC5 thru EC9)	Non-Upgraded Platforms (EC Not Complete)
Number of Platforms	169	101	68
MTBF Spec	900	900	900
MTBF Actual	4,654	27,869	2,004
Cumulative Hours	1,135,560	696,720	438,840
Number of Events	244	25	219



# GBS Program Description Shipboard Receive Suite (SRS)



- Mission Statement

- GBS Augments Other Military Satellite Communications (MILSATCOM) by Providing a High Speed (23.5MBPs per spot beam), One Way Information Flow of High Volume Data to Users Ashore, Afloat or Supporting Special Operations. It Provides the Capability of Quickly Disseminating Live Video and Large Files to Various Joint Training Exercises, Special Activities, Weapons Targeting, Intelligence,

- System Characteristics

- RF
  - Receive Only
  - Ka-Band Feed
  - 38" Diameter Reflector
  - 3 Axis Stabilized Pedestal
- Interfaces
  - Classified Products to Ship's Secret LAN
  - Unclassified Products to Ship's Unclassified LAN
  - Classified and Unclassified Video



- Nomenclature

- AN/USR-10 (V) 4 Dual Antenna
- AN/USR-10 (V) 5 Single Antenna



W/o front panel      With front panel  
Covers



# Fleet Update



## GBS Asymmetric (Split IP) Capability

- Purpose: To create a “Reach-back” capability to retrieve products directly from far-end sources, to provide greater versatility and utilization of current and future GBS bandwidth and communication capabilities, to provide interactive access during coverage time for inputting real-time parameters and allow for broader ship and user interactivity
- PEO C4I will receive (POM-08) funding to develop and implement Asymmetric IP on Navy ships in FY 08/FY09
- FY 07: Provided proposal to provide system engineering/materials to research, design, test and evaluate the Asymmetric IP capability on Navy ships. Start the EC/Field Change paperwork process to install in FY 08—awaiting decision

IP: Internet Protocol

POM: Program Objective Memorandum

PEO: Program Executive Office

EC: Engineering Change



# GBS IP Fielding Plan

- Surface GBS IP fielding complete on platforms originally identified for IP upgrade/backfit.
- Sub-Surface 90% complete on those platforms originally identified
- Added Features of GBS IP Include:
  - Multiple Video Channels (Multi-cast currently disabled)
    - Working on solution for classified multi-cast but intend to enable multi-cast on UNCLAS side FY07
  - Classified video on desktop or external video distribution
    - Site TV - 23TV or ships closed circuit TV
  - Faster and improved throughput of data and video streams
- Schoolhouse installations complete or scheduled in;
  - San Diego - TTF Bangor - SubSchool Groton
  - Norfolk (FY07) - TTF Kings Bay

TTF: Trident Training Facility  
IP: Internet Protocol



# Fleet Update



- Future GBS Procurements

- Have received plus up in FY09 to field on an additional 11 CG's, 10 DDG's and 10 remaining SSN
- Requirement comes from OPNAV initiative to increase bandwidth to "Shooters"
- Will request additional funds in FY10 for remaining CG's and DDG's

- 1GHz LNB Upgrade

- Purpose: Expands usable freq range from 500 MHz to 1 GHz
- Takes advantage of entire broadcast spectrum of WGS satellites coming online
- Available in FY 08 – as WGS comes online

- Software Upgrade 4.1.r (EC-7) (In Progress)

- Purpose: Fielding 4.1.r software for all 111 Navy GBS receive suites
  - USR-10: 79 (surface & submarine)
  - TSR-9: 32 (ground transportable)

- Tech Refresh

- Will provide upgrade and replacement for obsolete COTS components
  - IPv6 compliance, routing switches, Joint IP modem compatibility, NGRT antenna's, Operating System upgrade.

LNB: Low Noise Block

WGS: Wideband Global Satellite

COTS: Commercial Off The Shelf

NGRT: Next Generation Receiving Terminal



# SATCOM Reliability



# SATCOM Reliability Thru Q1 FY07



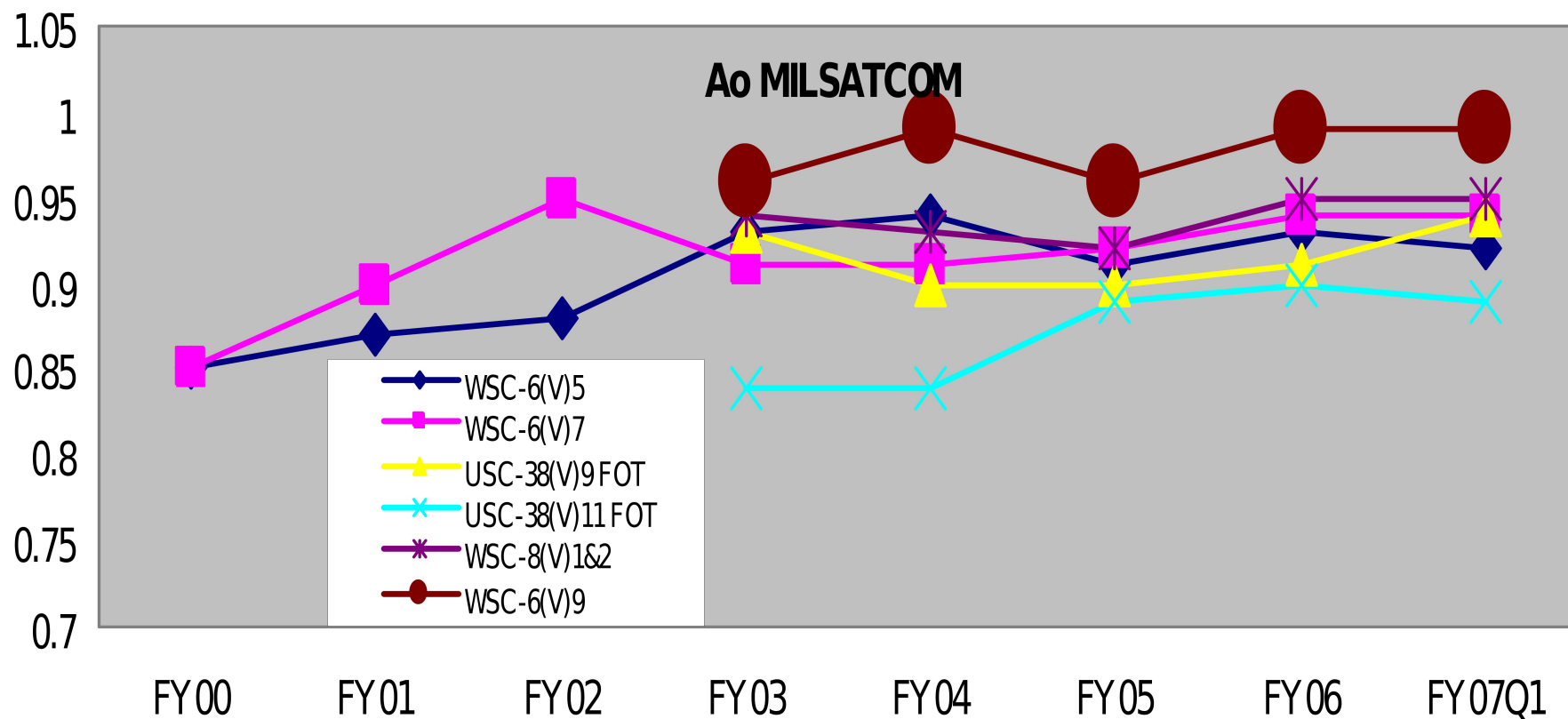
System	Fleet Population	Ao (Last 12 Months)	Ao (threshold)	MTBF (hrs)
SHF WSC-6(V)5	22	0.92 →	0.85	2,438 →
SHF WSC-6(V)7	42	0.94 →	0.85	3,400 →
SHF WSC-6(V)9	40	0.99 →	0.85	9,876 →
INMARSAT-B HSD	197	0.98 →	0.85	31,114 →
SHF WSC-8(V)1&2 / CWSP	27	0.95 →	0.85	3,257 →
EHF USC-38(V)2 LDR	14	0.95 →	0.90	10,628 →
EHF USC-38(V)4 LDR/MDR	32	0.90 →	0.90	2,666 →
EHF USC-38(V)9 FOT	87	0.94 →	0.90	4,640 →
EHF USC-38(V)11 FOT	40	0.89 →	0.94	2,128 →

SHF

EHF



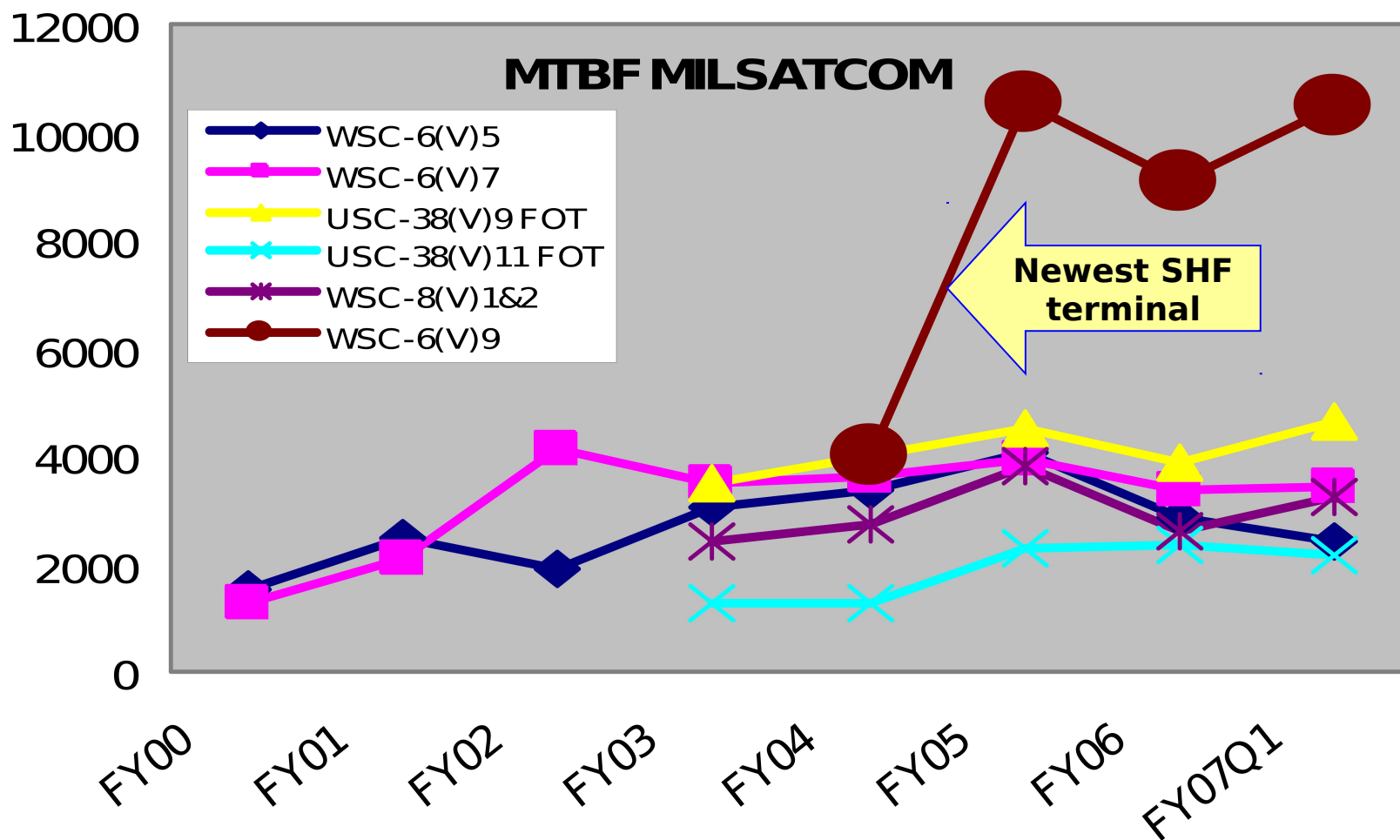
# MILSATCOM Ao Trends







# MILSATCOM MTBF Trends



Data thru Q1FY07

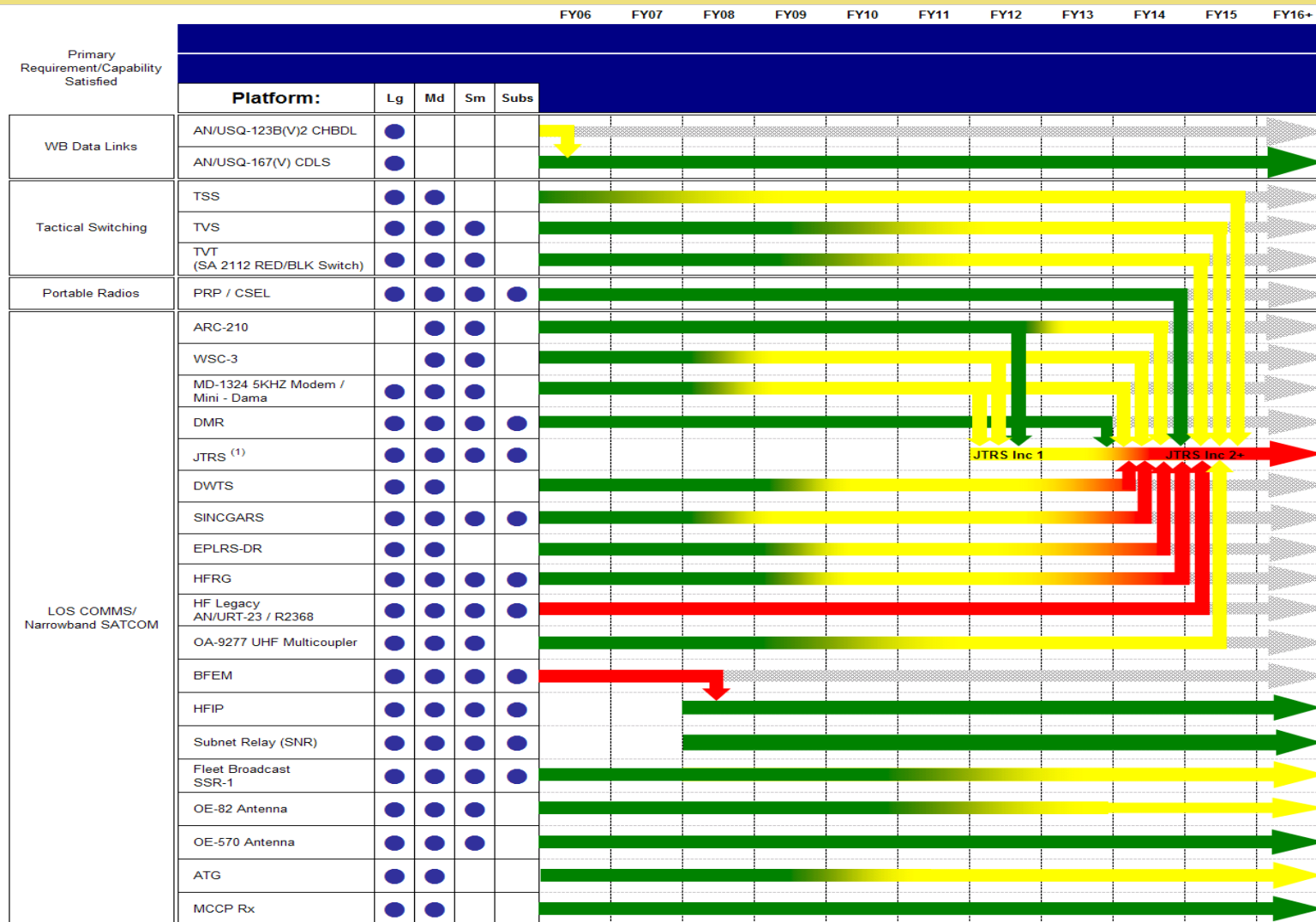
Prepared by: Naval Surface Warfare Center, Corona California



# Tactical Communications



# Tactical Radio Roadmap



Updated: 8 Nov 06



Acceptable System/Program Status  
Marginal System/Program Status  
Unacceptable System/Program Status  
System/Program Sustainment

<sup>(1)</sup>JTRS Inc 1: UHF SATCOM & MUOS  
WCDMA  
JTRS Inc 2+: Requirements & Funding



# **High Frequency Internet Protocol (HF-IP) and SubNet Relay (SNR)**



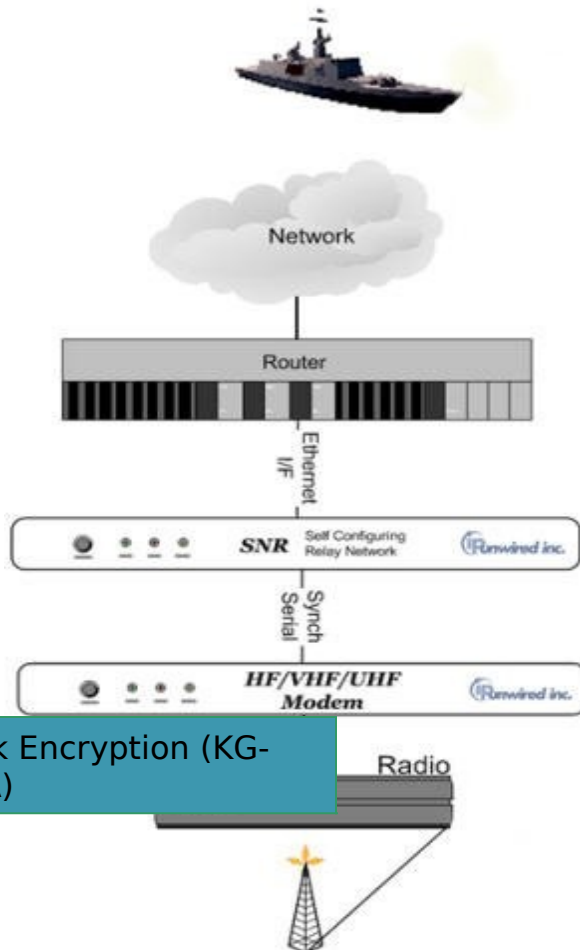
# HFIP and SNR System Description & Capabilities



- **SubNet Relay (SNR)** is a line of sight (UHF) communications path enabling warfighters on coalition networks to execute and plan in a tactical environment and also enables warfighters on a US Secret Network to execute and plan in a tactical environment with other US units
- **High Frequency-Internet Protocol (HF-IP)** is a Beyond Line of Sight (HF) communication path enabling warfighters on a coalition network to execute and plan in a tactical environment and also enables warfighters on a US Secret Network to execute and plan in a tactical environment with other US units

Capabilities	HFIP	SNR
Data Rates	9.6Kbps & 19.2Kbps	76Kbps
Interface with existing onboard crypto and RF systems if not being replaced	☐	☐
Support communications using international standards (e.g. Standard NATO Agreement STANAG 5066)	☐	
Provide distribution of IP data through a dedicated or existing shipboard LAN	☐	☐
Supports chat, e-mail, Common Operational Picture) COP dissemination, web and imagery applications	☐	☐
True adhoc, self forming, self healing, multi-hop, multi-node and relay capable	☐	☐
Range: single hop and multiple hops (up to 4)	< 200nm	20/80 nm
Form a network ~ 5 minutes (or less) and not reliant on a master station	☐	☐

# SubNet Relay Components



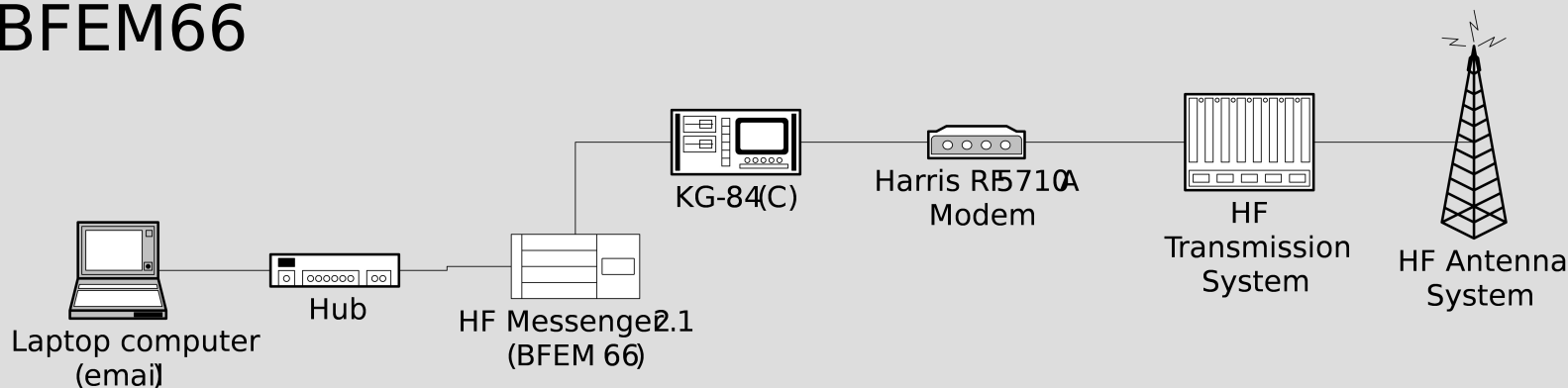
- Router – Use existing IP router.
  - Configuration of Routing Table required for Quality of Service
- SNR Node – “Brains” of SNR
  - controls operating modes, parameters, timings, ‘handshakes,’ etc.
- SNR Modem – HF/VHF/UHF
  - up to 9.6 Kbps 3kHz HF/up to 76.8 Kbps 25kHz V/UHF
  - Supports HF waveforms:
    - Mil-Std 188-110A and 188-110B
    - NATO STANAG 4285, 4415 VRBST, 4529 and 4539
- Bulk Encryption – provides TRANSEC
- Transceiver – Use ship fitted UHF radios with no modifications



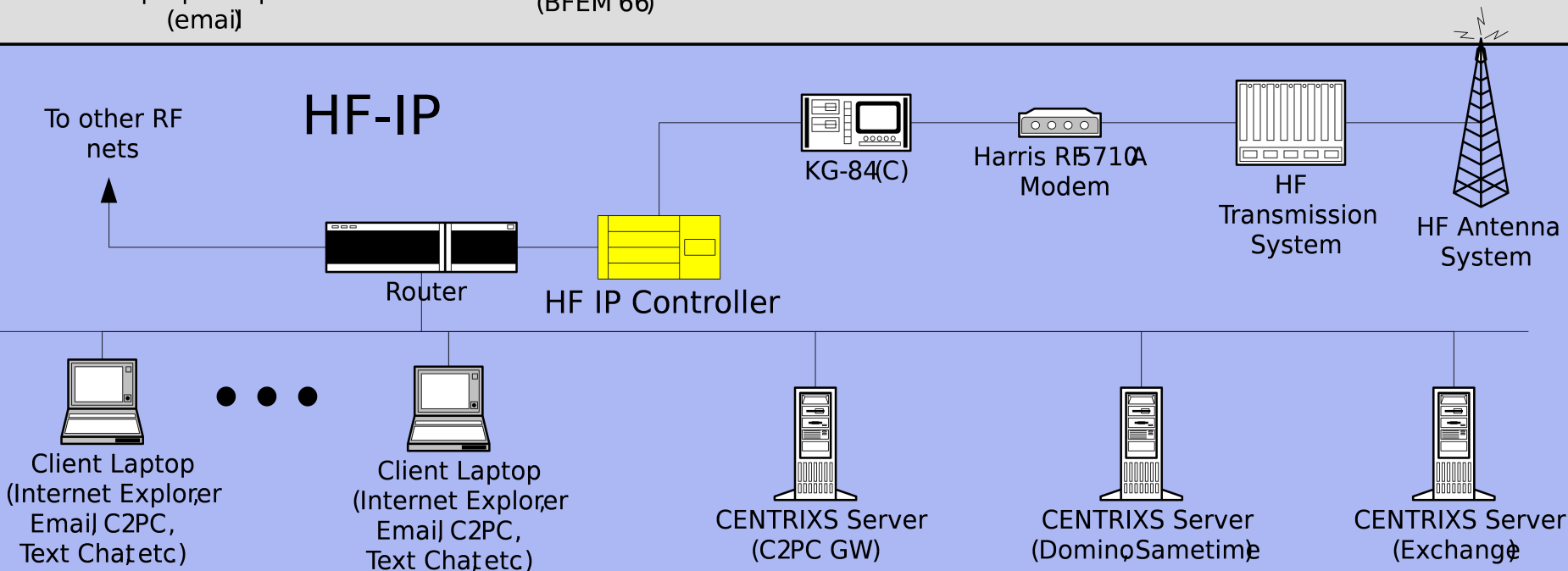
# BFEM 66 / HF IP Components (Shipboard Differences)



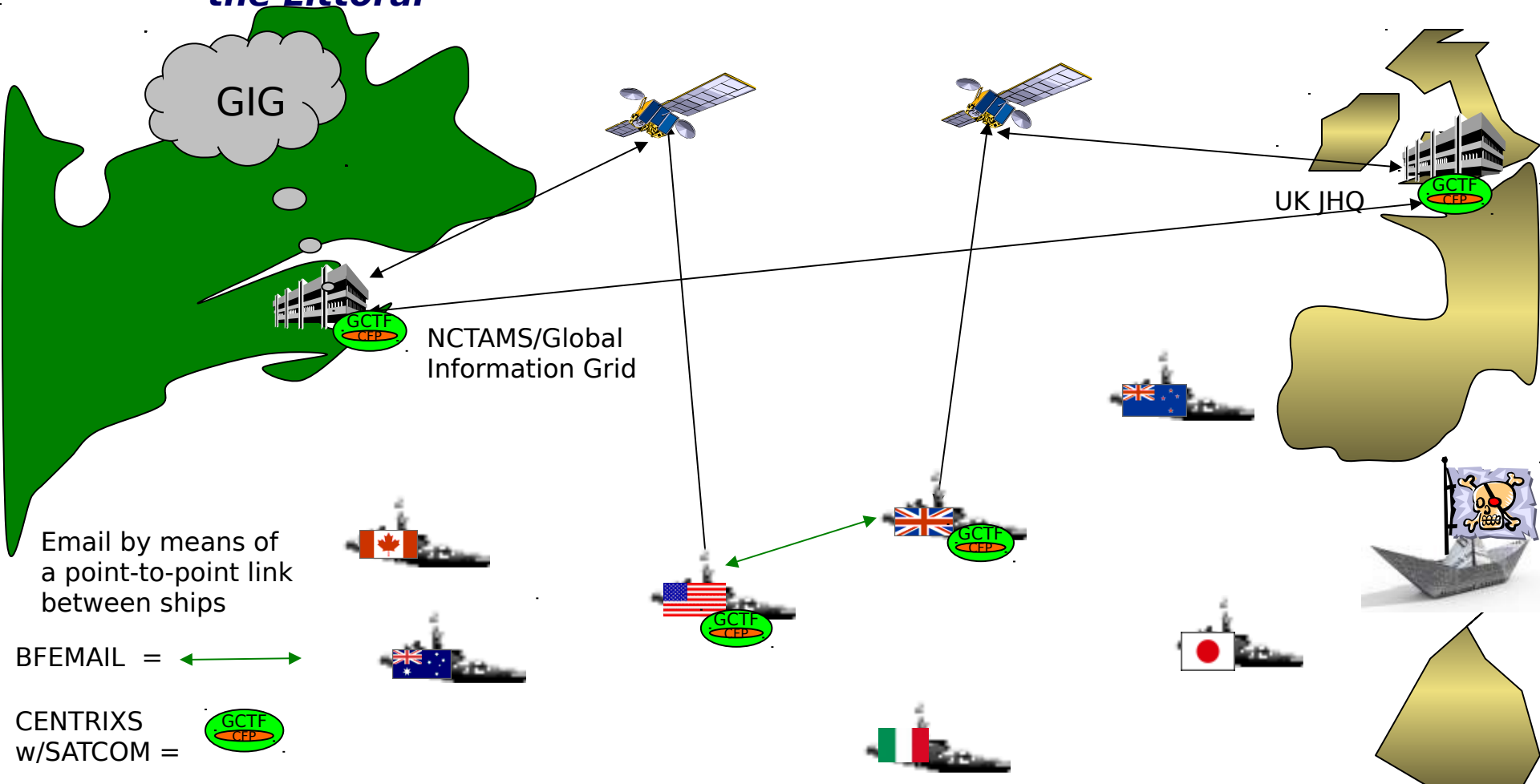
## BFEM66



## HF-IP



## Challenge to Coalition and Multinational C4 Interoperability in the Littoral

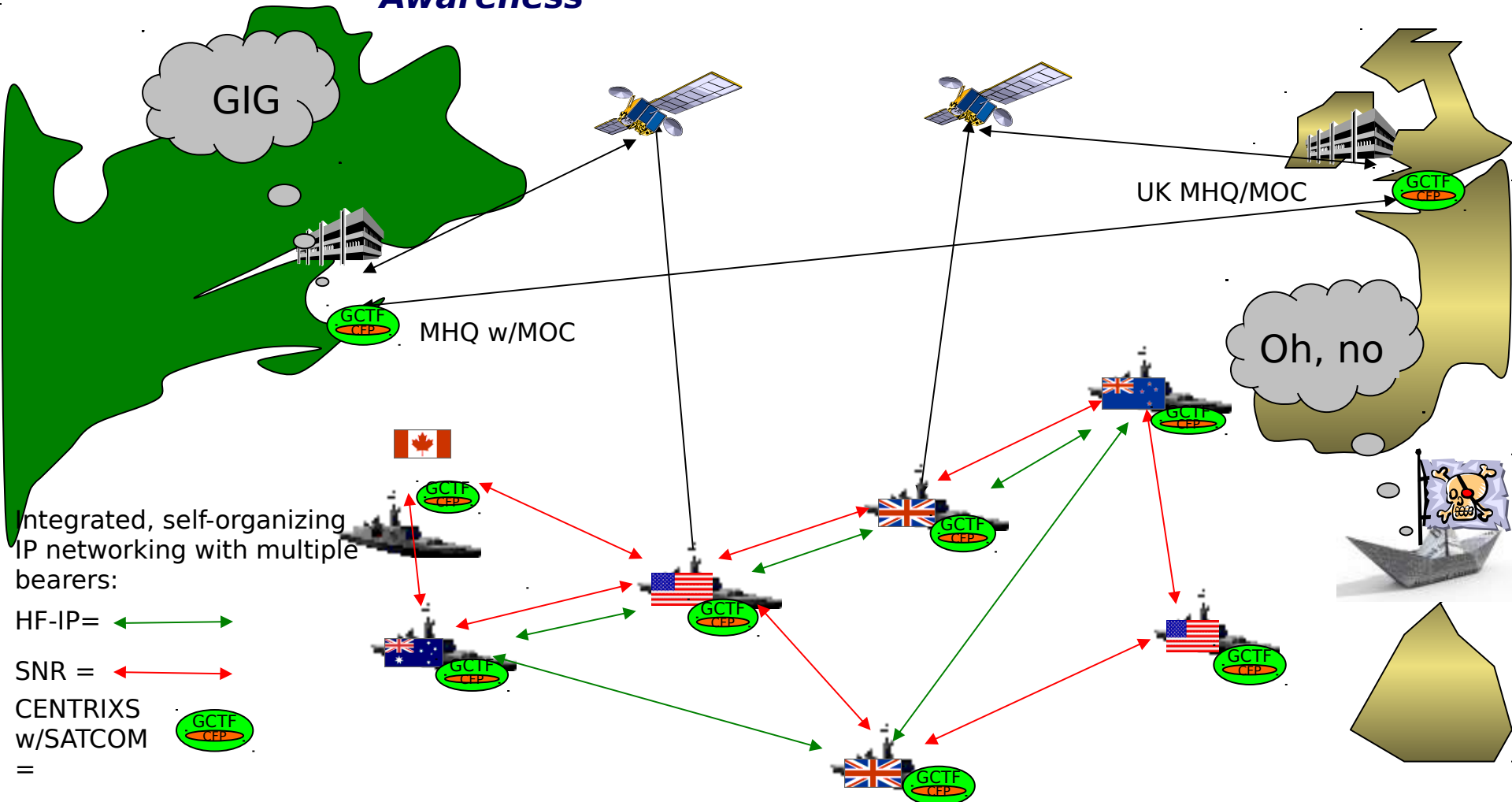






# Way Ahead to Coalition and Multinational Interoperability in the Littoral

*Enables Maritime Situational / Domain Awareness*



**GCTF: Global Counter-Terrorism Force**



# Summary



- Successful Completion Trident Warrior (TW) 2005, 2006 & 2007 demonstrations
- Approved Rapid Deployment Capability (RDC)
  - Approves fielding of 35 Ships and 10 Fly Away Kits in FY07
  - Awaiting Congressional Approval for Funding to Support RDC Efforts
- Acquisition Development Memorandum (ADM) Approved to Support Pre-acquisition Activities and transition to Program of Record



# Questions?



# Points of Contact



**MESSAGE PLA: PEO C4I SAN DIEGO CA//PMW/A170//**

NAME	FUNCTION	PHONE	EMAIL*
CAPT J ohn Pope	Program Manager	(619) 524-7954	john.pope
Vince Squitieri	Deputy PM	(619) 524-7940	vincentsquitieri
Mel Landis	SATCOM PAMP	(619) 524-7939	melvin.landis
CDR Mark Glover	Navigation PAMP	(619) 524-7766	mark.glover
Eric Campbell	Tactical Comms PAMP	(619) 524-7330	eric.campbell
Randy Wang	Future SATCOM PAMP	(858) 537-0527	randy.wang
Kai Tang	Commercial Lead	(619) 524-7616	kai.tang
Wendy Smidt	Technical Director	(619) 524-7474	wendy.smidt
Walter Schoppe	Director of Operations	(619) 524-7760	walter.schoppe
J orge Reyes	GBS/ESRP APM	(619) 524-7619	jorge.reyes
LCDR Dan Colpo	GPS Air Integration	(619) 524-7541	daniel.colpo
Ted Tanag	NAWWAR Sea APM	(858) 537-0640	teodoro.tanag
J ason Holgerson	NMT APM	(619) 524-7973	jason.holgerson
J oe Marsh	AMPHIB Systems	(760) 994-7144	leonard.marsh
J ames Boykin	HF Systems APM	(619) 524-7987	james.boykin
Ted Lew	SHF WSC-6(V)5,7,9 APM	(619) 508-1709	ted.lew
Randy Wang	TC/TSAT APM	(858) 537-0527	randy.wang
J effery Bergdahl	TSS/TVS/Portable Radios APM	(619) 524-7979	jeffery.bergdahl
Lindell Edwards	BFEM 66 /J TRS APM	(619) 524-7571	lindell.edwards
Kate Fox-Ogle	NESP APM	(619) 524-7960	kate.fox
Will Tong	SCN Coordinator	(858) 537-0360	will.tong

PAMP: Principal Assistant Program Manager

APM: Assistant Program Manager

**\*E-mail suffix is: @navy.mil**



# Back Up



# Operational Challenges

COMSEVENTHFLT DTG 140440Z MAR 07 highlights EHF Operational Challenges throughout the Fleet. MSG addressed to NNWC, PEO C4I, CENSURFCOMBATSYS (CSCS), CENIFODOM (CID), AND COMSPAWARSSCOM. PMW-170 working to generate a coordinated response.

- **Training** - CID and CSCS are in-process of curriculum re-write for schoolhouse EHF Operator and Maintainer courses. EHF ISEA, RMC and PMW SME's supported April 2006 SATCOM Course audit and provided review comments. Learning centers in-process of course re-write/update. EHF ISEA currently reviewing updated maint curriculum. NUWC NPT Fleet Training Team currently tasked to support CID development and review of operator Virtual Radio Room (VRR) Simulator and supporting curricula.
- **RMC manning** is a concern. PMW 170 has provided detailed ISEA Level EHF Maintenance Training to RMC LANT and PAC personnel. PMW-170 cannot control manning levels, but recommends improving JFFM troubleshooting process to reduce turn-over time from RMC to ISEA when RMC is undermanned. Next planned RMC training is FY08.



# Operational Challenges (cont)



- **Technical Manual and Troubleshooting** – System technical manuals have been updated to include ORB comments and EC/FC technical changes. TMs to be delivered with EC/FC installation. Some of the requested troubleshooting procedures are beyond ships force capabilities and are not included in schoolhouse training or onboard TMs. RMC and ISEA technicians are trained and have required documentation for these procedures.
- **Supply Support** – NAVICP 85321 awarded EHF PBL-C with Raytheon Technical Support Center (RTSC) to provide depot repair services and improved supply support (i.e., repair turn-around time, material availability, etc.). PMW-170 to request metrics to track improvements.
- **System Reliability** – PMW/ISEA to identify which C7F platforms have received reliability/ baseline ECs/FCs and coordinate installation of upgrades onboard un-installed units. PMW has also tasked NSWC Corona to monitor upgraded platforms to track for improved RM&A results.



# Operational Challenges (cont)

- Four of five of the platforms identified in the message do not have EC 7 Production Baseline Hardware Upgrades or EC 9 Baseline Software Build
  - 3 of the 4 platforms would have avoided issue if ECs were implemented and the remaining platform has a structural issue
  - The platform that has the ECs had incorrectly loaded Adata – it did not match their software build – it has since been corrected
  - PEO is working diligently through the Shipmain process to field ECs in 7<sup>th</sup> Fleet
  - NWSC Corona – NWSA data shows CY06 average  $A_0$  for the five platforms as .93
- The PEO and OEM have partnered to do an in-depth analysis of failure data, and plan to add NWSC Corona and NAVICP to the team
  - This will help with identifying root cause failures on high failure rate items and expedite new EC generation
  - This will also provide a more accurate system  $A_0$
- PEO has several new ECs in progress
  - The Solid State Amplifier (SSA) Surge Protector will significantly reduce the number of SSA failures
  - The SSA EC will be added to the implementation of EC 7 to ensure quick fielding